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(54) Title: **VACUUM CLEANER**

(57) Abstract: The present invention relates to a module (8) to be used in vacuum cleaners that comprises the necessary components (12, 28, 31) required for the use of said vacuum cleaner which allows the practical use of motors (12) of different dimensions and characteristics in the same or different casings (1), without any vibration and noise.

## VACUUM CLEANER

5

The present invention relates to a module for domestic appliances, more particularly for vacuum cleaners, that allow the assembling of motors of different dimensions and properties.

10 In the known practices, vacuum cleaners comprise a casing wherein such components as the motor, dust bag, etc. are received. The characteristics with respect to usage, of the vacuum cleaners are generally determined by their motors with different features and dimensions, according to their intended uses. As the features and dimensions of the motor change, the structure of the casing in which  
15 it is placed, must also change. When a motor with same characteristics is desired to be used in other casing, such components as insulation material and components, cable winder, key assembly etc., as well as the motor, must be adapted to the new chassis. This may create difficulties in production.

20 In the US Patent No. 4527302, a main frame comprising a vacuum cavity, a motor-fan housing placed behind the vacuum cavity and a cord-reel next to the motor assembly is disclosed. Said main frame is surrounded by an exterior lower shall, rear and top decks or covers. This has to be re-arranged when the dimensions of the motor change. When the main frame as a whole is intended to  
25 be implemented in other vacuum cleaners, design restrictions and limitations arise.

In the European Patent Application No. 0730840 (A2), an internal support element consisting of several compartments, to be used in various vacuum  
30 cleaners is disclosed. This element also, has to be adapted to the new motor when the motor sizes are changed. When the internal support element as a whole is

intended to be implemented in other vacuum cleaners, design restrictions and limitations arise.

In the German Patent Application No. 351667 (A1), the motor fitted in the recesses formed in the vacuum cleaner chassis and the orientation of the air sucked in, are disclosed. For varying motor dimensions, the casing has to be modified too.

In the European Patent No. 0378191, a method for assembling the components of a vacuum cleaner housing is disclosed. Here, the component parts are assembled individually.

The object of the present invention is to realize a module to be used in vacuum cleaners of different dimensions and characteristics, that comprises the components required for the use of said vacuum cleaner, which allows the practical use of motors of various dimensions in the same or different chasses, without any vibration and noise.

The vacuum cleaner realized in order to attain said object of the present invention, has been illustrated in the attached drawings, wherein:

- Figure 1, is the schematical view of a vacuum cleaner.
- Figure 2, is the general 3-dimensioned view of a vacuum cleaner.
- Figure 3, is the exploded 3-dimensioned view of a vacuum cleaner with the module group.
- Figure 4a, is the back 3-dimensioned view of the module group.
- Figure 4b, is the front 3-dimensioned view of the module group.
- Figure 5, is the exploded 3-dimensioned view of the module group.
- Figure 6a, is the front 3-dimensional view of the motor rear rubber buffer.
- Figure 6b, is the bottom 3-dimensional view of the motor rear rubber buffer.
- Figure 6c, is the plan 3-dimensional view of the motor rear rubber buffer.
- Figure 7, is the 3-dimensioned view of the rubber vibration damper.

Figure 8, is the back 3-dimenisonal view of the capsule and the capsule lid in an open position.

The components shown in the drawings are given separate reference numerals  
5 as follows:

1. Vacuum cleaner housing
2. Hose
3. Pipe adapter
- 10 4. Pipe
5. Brush
6. Vacuum chamber
7. Dust bag
8. Module
- 15 9. Hepa filter
10. On/off button
11. Capsule
12. Motor
13. Guide
- 20 14. Module housing
15. Module lid
16. Capsule housing
17. Capsule lid
18. Guide felt
- 25 19. Vacuum cleaner front upper casing
20. Vacuum cleaner rear upper casing
21. Motor sponge
22. Motor rear rubber buffer
23. Module sealing gasket
- 30 24. Capsule bearing gasket
25. Fan bearing gasket

- 26. Motor cable bore
- 27. Cable sealing gasket
- 28. Electronic circuit card
- 29. Cooling plate
- 5 30. Cooling plate slot
- 31. Cable winder
- 32. Cable
- 33. Cable winder plate
- 34. Guiding roller
- 10 35. Cable winder button
- 36. Exhaust filter cassette
- 37. Clamping gasket
- 38. Rubber vibration damper
- 39. Rubber pin guide
- 15 40. Rubber pin
- 41. Star protrusion
- 42. Buffer
- 43. Module screw hole
- 44. Mounting projection
- 20 45. Mounting cavity
- 46. Clamping gasket surface
- 47. Module inlet
- 48. Module outlet
- 49. Motor outlet
- 25 50. Vacuum cleaner upper casing
- 51. Vacuum cleaner lower casing
- 52. Dust bag lid
- 53. Wheel
- 54. Hose coupling socket
- 30 55. Panel
- 56. Module felt pad

- 57. Rubber vibration damper socket
- 58. Motor centring bearing
- 59. Filter housing
- 60. Wheel nest
- 5 61. Screw support
- 62. Cable winder casing
- 63. Capsule socket
- 64. Cable reel
- 65. Module attachment protrusion
- 10 66. Switch housing
- 67. Capsule attachment protrusion
- 68. Capsule attachment socket
- 69. Buffer guide
- 15 70. Locking flap
- 71. Rubber pin support

The vacuum cleaners, particularly the dry type cleaners comprise a housing (1) preferably made of rigid plastic material, wherein the operation and control unit is contained; a resilient hose (2) preferably made of plastic material, connected to said housing (1); a pipe adapter (3) connected to said hose (2), to facilitate the handling of the tube by the user; an extension pipe (4) made of metal or preferably of rigid plastic material, connected to said pipe adapter (3) and a brush (5) connected to the end of said pipe (4) for cleaning the rugs and/or hard ground surfaces.

The vacuum cleaner housing (1) comprises an upper casing (50) consisting of a front upper casing (19) and a rear upper casing (20) and a lower casing (51). Said vacuum cleaner front upper casing (19) is provided with a hose coupling socket (54) and a dust bag lid (52); whereas on the rear upper casing (20), there is a panel (55) on which several light indicators and/or buttons such as the cable winder

button (35), on/off button (10), etc. are provided. Under the upper casing (50) and above the lower casing (51), below the dust bag lid (52) and behind the hose coupling socket (54), a vacuum chamber (6) is provided and there is a dust bag (7) in said vacuum chamber (6) and a module (8) behind it. and an exhaust filter  
5 cassette (36) containing a filter housing (59) with a hepa filter (9) placed in said housing (59), is provided behind said module (8). The lower casing (51) contains one or more screw supports (61), one or more rubber vibration damper sockets (57), one or more wheel nests (60) facilitating the movement of the vacuum cleaner, at both sides; and wheels (53) placed in said wheel nests (60).

10

The module (8) according to the present invention comprises a module housing (14) and a module lid (15) which are fastened to each other preferably both by screws and by tight -fitting. When said module housing (14) and lid (15) are fastened to each other, by virtue of their inner forms, the cable winder casing (62)  
15 and the capsule socket (63) are formed between them.

A switch housing (66) and a motor cable bore (26) are provided on the external upper section of said module lid (15). The module lid (15) is also provided with a perforated clamping gasket surface (46), and with one or more  
20 clamping gaskets (37) , inserted into the holes on said clamping gasket surface (46).

In a preferred embodiment, the hermetic module (8) is fixed by means of one or more clamping gaskets (37) at its upper section; by screwing at its middle  
25 section by means of one or more module screw holes (43) and by means of one or more module attachment protrusion (65) and is supported by one or more preferably star sectioned rubber vibration dampers (38) placed in the rubber vibration damper socket (57), at its lower section.

30 A noise and vibration damping module felt pad (56) constituted by numerous sponge pieces, to avoid the negative impacts of the occurring over-heating, on the

module casing, that surrounds the inner surfaces and is preferably attaches by an automatic clips; a motor rear rubber buffer (22), on the module felt pad (56), fastened to a guide (13) containing a guide felt (18) which includes a capsule (11) and a capsule bearing gasket (24) attached to said capsule (11), are provided in the capsule socket (63). Said capsule socket (63) is provided with a module inlet (47) and a module outlet (48). Said module outlet (48) is surrounded by a module sealing gasket (23) on which a cooling plate slot (30) is located. At the section where said sealing gasket (23) is provided, a rubber pin support (71) in which the motor rear rubber buffer (22) is fastened and a rubber pin guide (39) on said rubber pin support (71) are located on the module housing (14). Said capsule (11) is fastened to the module outlet (48) by the motor rear rubber buffer (22) and to the module inlet (47) by the capsule bearing gasket (24).

The capsule (11) is formed by a capsule housing (16) and a capsule lid (17) that are preferably tight-fitted to each other. The front section of the capsule housing (16) is provided with one or more capsule attachment protrusions (67), preferably one mounting cavity (45) to avoid the mounting errors during the assembly, whereas the rear section is provided with the buffer guide (69) through which the motor rear rubber buffer (22) passes. Capsule attachment sockets (68) of a number, form and position matching with the capsule attachment protrusion (67) and a mounting projection (44) in a form and position matching with the mounting cavity (45) are provided on the capsule lid (17). The capsule (11) contains a motor sponge (21), inside said sponge (21) a motor (12) preferably with a fan, a motor outlet (49) at the rear portion of the motor (12), and the motor (12) fan as well as a fan bearing gasket (25) and the capsule lid (17) are provided at the front section. Said capsule lid (17) is connected to the module inlet (47) that provides air suction. The fan bearing gasket (25), matching with the module inlet (47), serves also as a sealant and is fastened to the inner side of the capsule lid (17) after being placed into the capsule bearing gasket (24).

30



The cable winder casing (62) contains a cable winder (31) and preferably two guiding rollers (34). Said cable winder (31) comprises a cable winder plate (33), a cable reel (64) on said winder plate (33), a cable (32) and a plug wound around the cable reel (64), providing the mains voltage required for the operation of the motor (12). As the operational area of the vacuum cleaner is quite large, the cable (32) is long and is kept as wound around the cable winder (31) in the module housing (14) to save space. The cable winder plate (33) is preferably placed vertically to be fastened to the module (8). The cable winder button (35), situated out of the module housing (14), activates the mechanism that enables the cable (32) to be wound around the cable winder (31). By means of the on/off button (10) on the panel (55), said mains voltage operates and/or stops the vacuum cleaner only at the moments chosen by the user.

A cable sealing gasket (27) is placed in the motor cable bore (26) to allow the cables from the motor to be drawn out, below the capsule lid (17) fan bearing gasket (25). Said cables drawn out by means of the cable sealing gasket (27) are connected to the electronic circuit card (28) placed on the module lid (15) controlling the sensor and motors. A cooling plate (29) is provided on the electronic circuit card (28) to cool it. Said cooling plate (29) is fixed onto the module housing (14) by inserting it into the cooling plate slot (30) holding the card on the air flow direction, to save place and to allow, easy cooling.

The capsule housing (16) and the guide (13) are connected to each other without using any fasteners, by means of one more locking flaps (70) preferably arranged with equal intervals on the guide (13). In a preferred embodiment, three short and three long locking flaps (70) arranged with equal intervals, are used. When the locking flap (70) is thin, vibrations occur and when they are thick, difficulty in mounting is observed. In order to avoid such vibration and mounting problems, the locking flap (70) is made with an optimum thickness.

30

On the motor rear rubber buffer (22), one or more buffers (42) with hollow chambers at their sides, a rubber pin (40) fitted into the rubber pin guide (39), on said buffer (42), and one or more star protrusions (41) preferably with threaded section , at the lateral sides of said buffers (42), that narrow the section areas to  
5 enhance the resilience capacity and that provides damping, are provided. Said rubber pin (40), fits into the rubber pin guide (39). A motor centering bearing (58) that provides an accurate mounting of the motor (12) by centering, is located at the rear portion of the motor rear rubber buffer (22). Said motor rear rubber buffer (22), preferably made of plastic and has a structure suitable to heat transfer,  
10 provides the connection of the motor (12) and therefore of the capsule (11), to the capsule housing (16); transfers the moment of rotation coming from the motor (12) to the capsule housing (16) and prevents the fall of the module (8) when it is turned over.

15 Air, sucked in through the brush (5) reaches the dust bag (7) in the vacuum chamber (6), by means of the pipe (4), pipe adapter (3) and the hose (2). Then it leaves the dust bag towards the module inlet (47), passes through the fan and is directed towards the motor outlet (49) that has a wider cross section. When it leaves from the motor outlet (49), it strikes against the inner surface of the module  
20 guide felt (18) to realize noise damping and direction modification. By circulating the air inside the module (8) its energy is removed and speed is lowered. Thus, the low-speed air is discharged passing over the module (8) surfaces. Said reduction in the speed of the air, facilitates the filtering of air borne dust or dirt, sucked in together with air.

25

Said module (8) is made according to the largest motor (12) that can be used for vacuum cleaners; and thus a motor smaller than the motor used as a standard, can only be used in this module (8) by using suitable felt pads. As all components required for the operation of a vacuum cleaner are located on the module (8),  
30 vacuum cleaners with different characteristics can be produced by using the same or different cleaner housing (1) only by changing the module (8) . Since said

module (8) has the standard dimensions, it can be used in all vacuum cleaner housing (1) matching with said dimensions. Thus, by changing the motor (12) and/or components, contained in the module, or only the module, vacuum cleaners with different characteristics may be manufactured. As the module (8) comprises  
5 all components required for the operation of a vacuum cleaner due to its structure, the dimensions of the vacuum chamber is defined and delimited only by the dust bag to be used. In this way the utility space in the cleaner casing is increased and a freedom in design is created.

10       As the module (8) comprises all components required for the operation of a vacuum cleaner, in case a problem rises in the vacuum cleaner, a fast service can be provided by replacing the module group only. Since said module (8) can also be used in different cleaner casings, any desired module can be placed in any desired casing. Thus, the usage performance and characteristics of vacuum  
15 cleaners may be modified by only replacing the module group.

## CLAIMS

1. A vacuum cleaner, including a vacuum cleaner housing (1) containing such components as a motor (12), an electronic circuit card (28), and a cable winder (31) which are required to operate and control said vacuum cleaner, and of a resilient hose (2) connected to the housing (1), characterized with a module (8) comprising a module housing (14), a module lid (15), a cable winder casing (62) formed between the module housing (14) and the module lid (15) when they are attached to each other, and a capsule socket (63); which can easily be mounted removably in the vacuum cleaner housings (1) of different dimensions and forms, which may have different properties by the mounting/ dismounting or replacement of such components as the motor (12), electronic circuit card (28) and the cable winder (31).
2. A vacuum cleaner as defined in Claim 1, characterized with a vacuum cleaner housing (1) wherein the module can retractably mounted, comprising a lower casing (51) and an upper casing (50) formed by a front upper casing (19) and a rear upper casing (20), said front upper casing (19) being provided with a hose coupling socket (54) and a dust bag lid (52), whereas on rear upper casing (20) a panel (55) on which several light indicators and/or buttons such as the cable winder button (35), on/off button (10), etc. are provided; under the upper casing (50) and above the lower casing (51), below the dust bag lid (52) and behind the hose coupling socket (54), a vacuum chamber (6) is provided and there is a dust bag (7) in said vacuum chamber (6) and a module (8) behind it and an exhaust filter cassette (36) containing a filter housing (59) with a hepa filter (9) placed in said housing (59), is provided behind said module (8), the lower casing (51) contains one or more screw supports (61), one or more rubber vibration damper sockets (57), one or more wheel nests (60) facilitating the movement of the vacuum cleaner, at both sides; and wheels (53) placed in said wheel nests (60).

3. A vacuum cleaner as defined in Claim 1, and 2, characterized with a module (8) comprising one or more clamping gasket surfaces (46) on its upper exterior section, one or more module screw holes (43) and one or more module attachment protrusions (65) on its middle exterior section; and one or more rubber vibration damper sockets (57) at its lower exterior section; which is sealed and fixed at its middle section by means of one or more module screw holes (43) and one or more module attachment protrusions (65), and supported by one or more rubber vibration dampers (38) placed into the rubber vibration damper socket (57) at its lower section.
4. A vacuum cleaner as defined in Claim 1, to 3, characterized with one or more preferably star sectioned rubber vibration dampers (38) placed in the rubber vibration damper socket (57), at its lower section, which dampen the vibration created on the module (8).
5. A vacuum cleaner as defined in Claim 1, to 4, characterized with a capsule socket (63) connected to the module inlet (47) by means of the capsule bearing gasket (24) and to the module outlet (48) by means of the motor rear rubber buffer (22), comprising a switch housing (66) and a motor cable bore (26), a cable sealing gasket (27) placed in the motor cable bore (26), the electronic circuit card (28) placed on the module lid (15) controlling the sensor and motor to which the cables from the motor are connected by means of the cable sealing gasket (27), a cooling plate (29) provided on the electronic circuit card (28) to coolit and a cooling plate slot (30) holding the card on the air flow direction, to save placed and to allow easy cooling; a noise and vibration damping module felt pad (56) constituted by numerous sponge pieces, to avoid the negative impacts of the occurring over-heating, on the module casing, that surrounds the inner surfaces and is preferably attached by an automatic clips; a motor rear rubber buffer (22), on the module felt pad (56), fastened to a guide (13) containing gab guide felt (18) which includes a capsule (11) and a capsule bearing gasket (24) attached to said

capsule (11), as well as a module inlet (47) and a module outlet (48), said module outlet (48) being surrounded by a module sealing gasket (23) on which a cooling plate slot (30) is located, and at the section where said sealing gasket (23) is provided, a rubber pin support (71) in which the motor rear rubber buffer (22) is fastened and a rubber pin guide (39) on said rubber pin support (71).

6. A vacuum cleaner as defined in Claim 1 to 5, characterized with a capsule (11) formed by a capsule housing (16) and a capsule lid (17) that are preferably tight-fitted to each other, comprising a motor sponge (21), inside said sponge (21) a motor (12) preferably with a fan, a motor outlet (49) at the rear portion of the motor (12), and the motor (12) fan as well as a fan bearing gasket (25).

7. A vacuum cleaner as defined in Claim 1 to 6, characterized with a capsule (11) comprising one or more capsule attachment protrusions (67), preferably one mounting cavity (45) to avoid the mounting errors during the assembly, whereas the rear section being is provided with the buffer guide (69) through which the motor rear rubber buffer (22) passes at the front section of the capsule housing (16), and capsule attachment sockets (68) of a number, form and position matching with the capsule attachment protrusion (67) and a mounting projection (44) in a form and position matching with the mounting cavity (45) on the capsule lid (17) at the section wherein the motor (12) fan is placed.

8. A vacuum cleaner as defined in Claim 1 to 7, characterized with a cable winder casing (62) comprising a cable winder (31) and preferably two guiding rollers (34), with one or more clamping gaskets (37) placed into the holes provided on the clamping gasket surface (46), above it.

9. A vacuum cleaner as defined in Claim 1 to 8, characterized with a cable winder (31) comprising a cable winder plate (33) preferably placed vertically to be fastened to the module (8), a cable reel (64) on said winder plate (33), a cable (32) and a plug wound around the cable reel (64), providing the mains voltage required for the operation of the motor (12), a cable winder button (35), situated out of the module housing (14), activating the mechanism that enables the cable (32) to be wound around the cable winder (31), which allows the mains voltage to operate and/or stop the vacuum cleaner only at the moments chosen by the user, by means of the on/off button (10), and which enables the cable (32) that is too long as the operational area of the vacuum cleaner is quite large to be kept as wound around the cable winder (31) in the module housing (14) to save space.
10. A vacuum cleaner as defined in Claim 1 to 9, characterized with one or more locking flaps (70) preferably arranged with equal intervals on the guide (13), with an optimum thickness to avoid vibrations and to facilitate the mounting, which connects said guide (13) and the capsule housing (16) without using any fasteners.
11. A vacuum cleaner as defined in Claim 1 to 10, characterized with a motor rear rubber buffer (22) comprising one or more buffers (42) with hollow chambers at their sides, a rubber pin (40) fitted into the rubber pin guide (39) on said, buffer (42), and one or more star protrusions (41) preferably with threaded section, at the lateral sides of said buffers (42), that narrow the section areas to enhance the resilience capacity and that provides damping, preferably made of plastic and has a structure suitable to heat transfer, which provided the connection of the motor (12) and therefore of the capsule (11) to the capsule housing (16); transfers the moment of rotation coming from the motor (12) to the capsule housing (16) and prevents the fall of the module (8) when it is turned over.

FIGURE 1

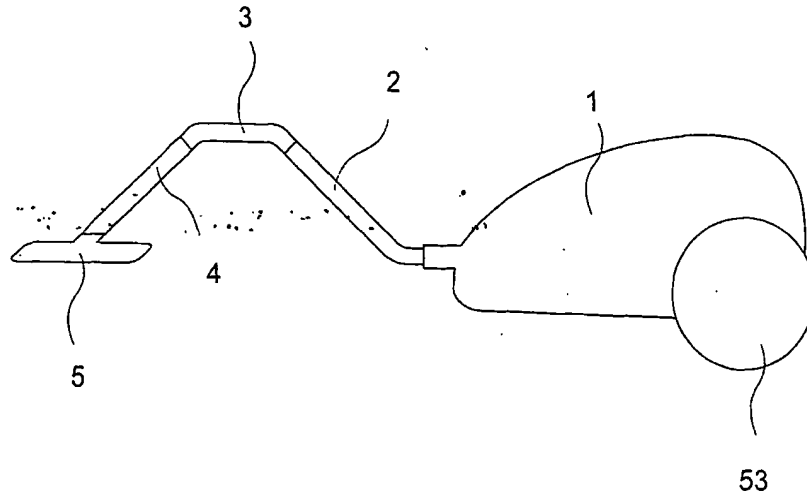


FIGURE 2

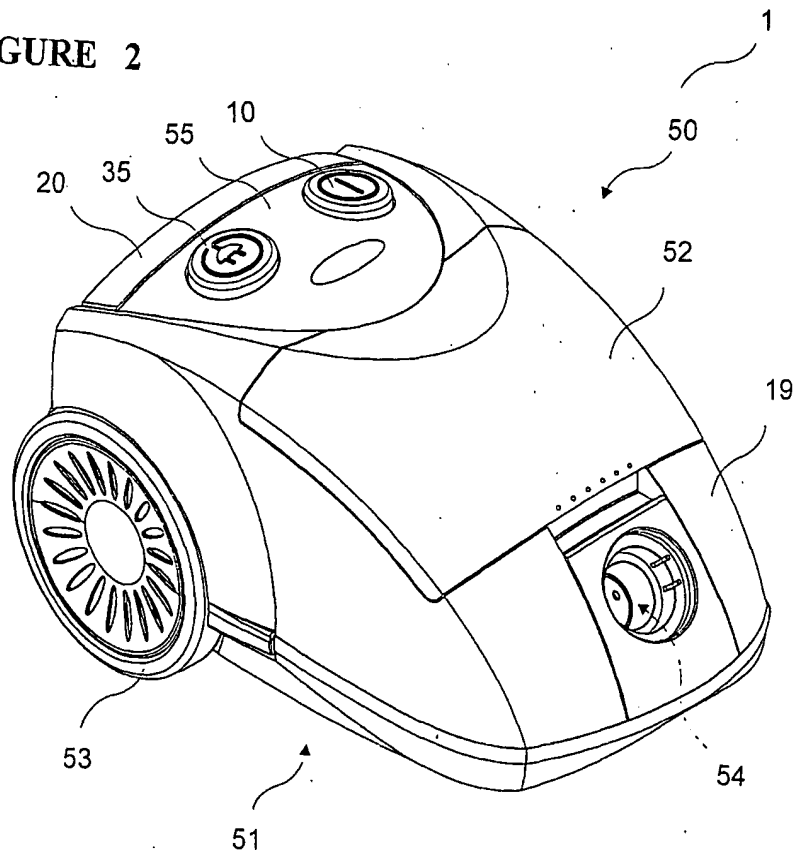




FIGURE 3

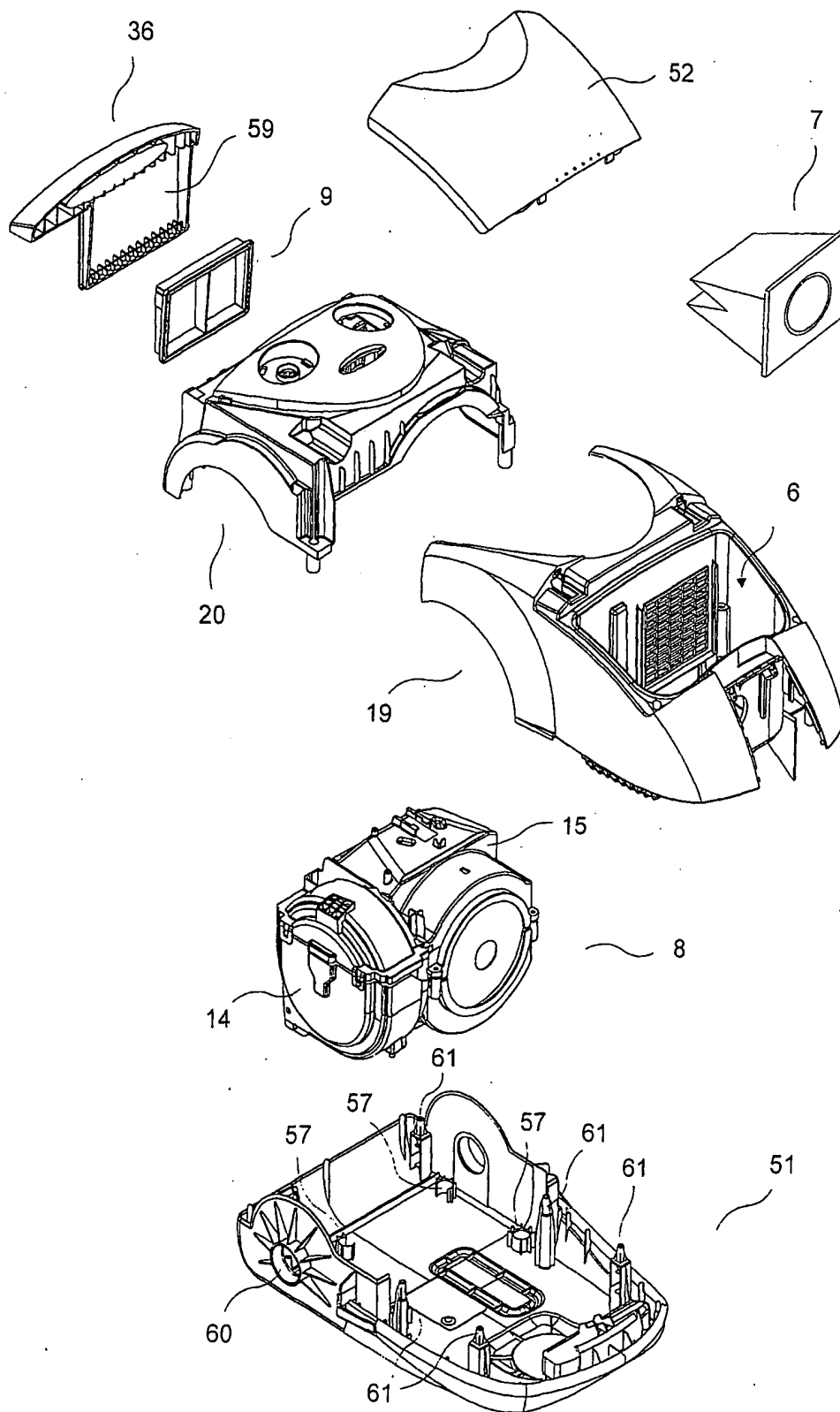


FIGURE 4A

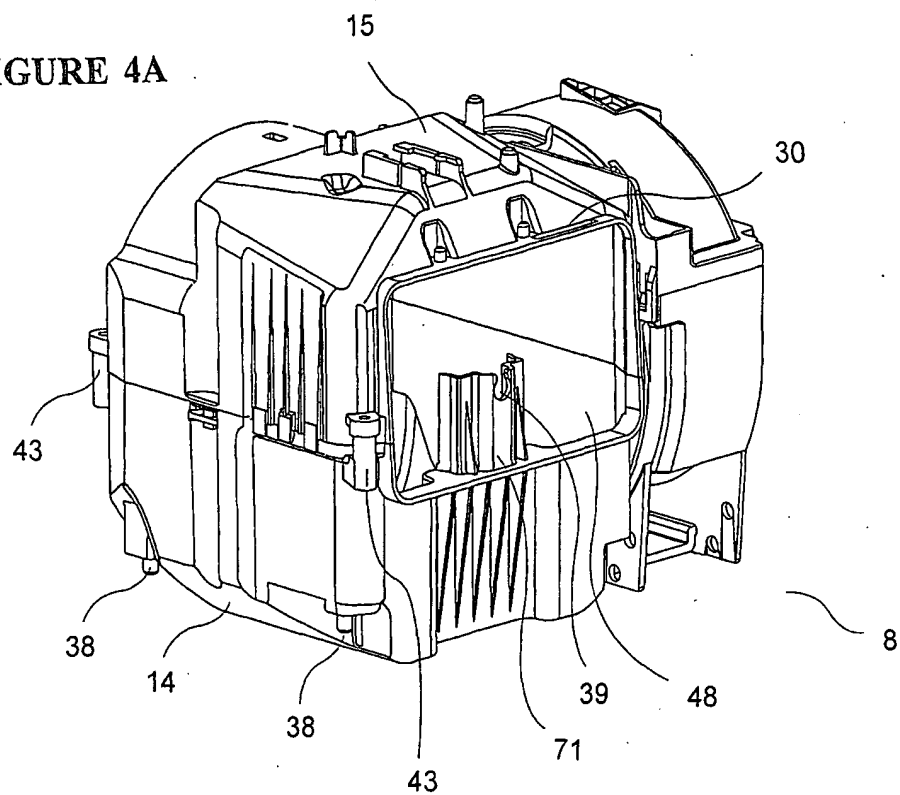
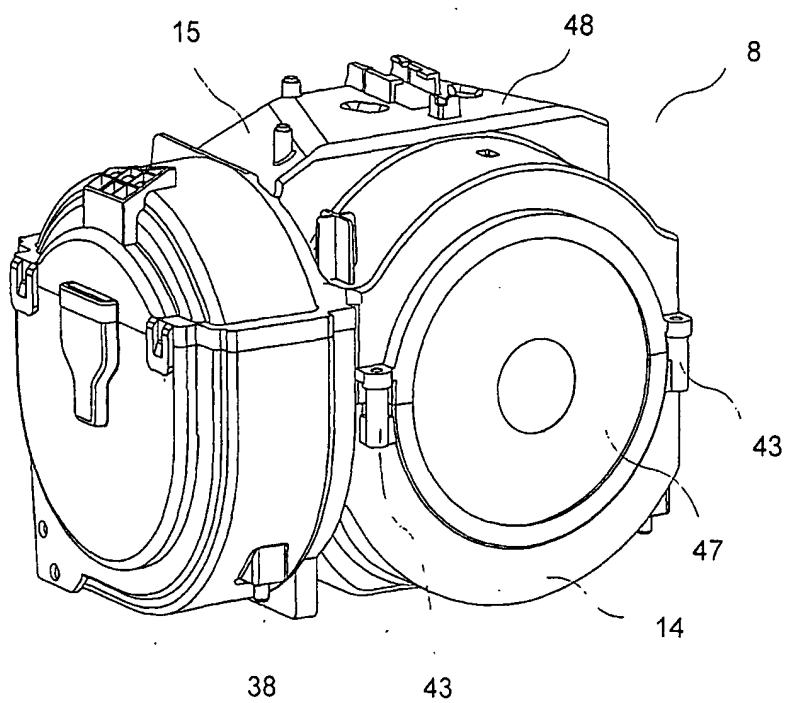


FIGURE 4B



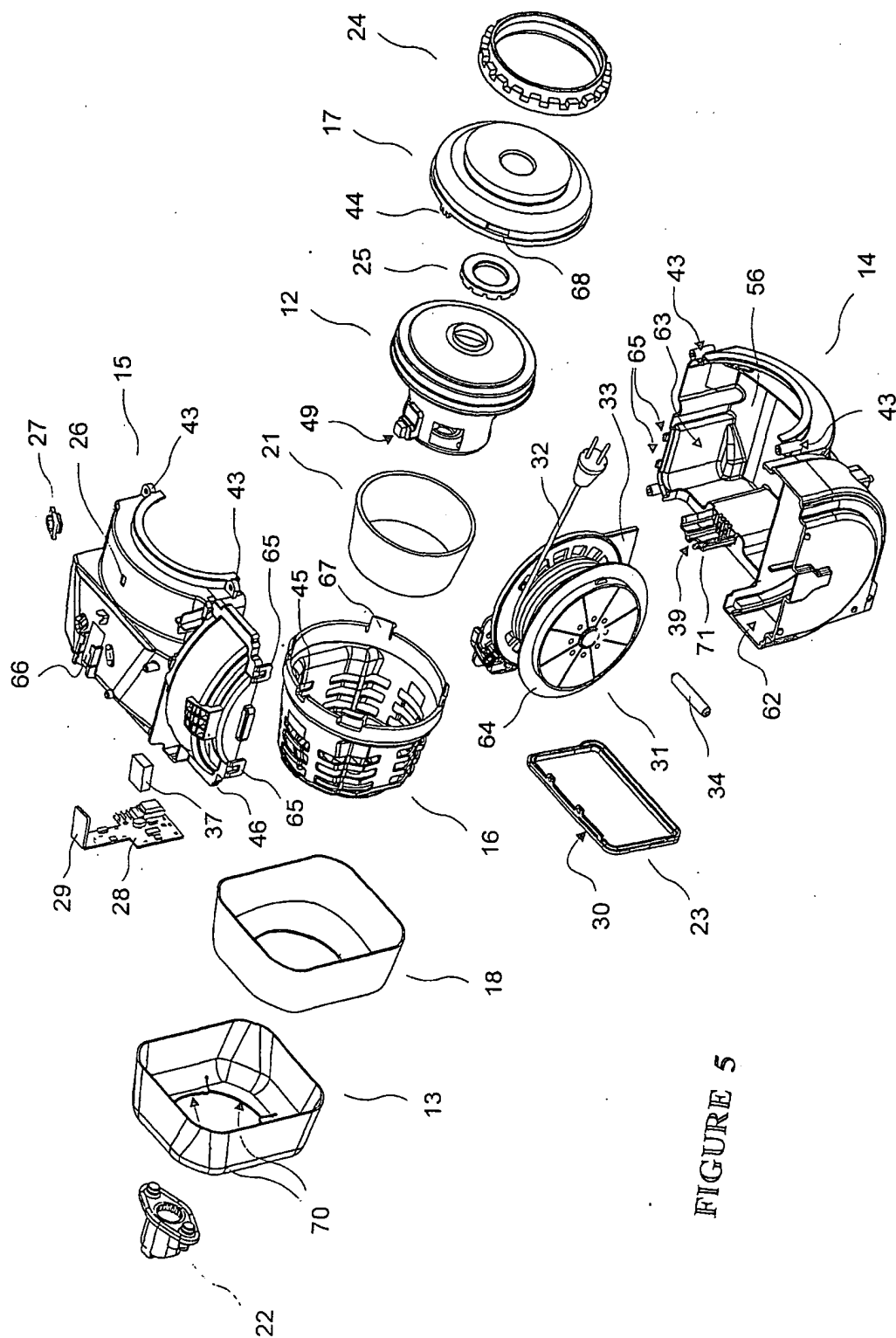


FIGURE 5

FIGURE 6A

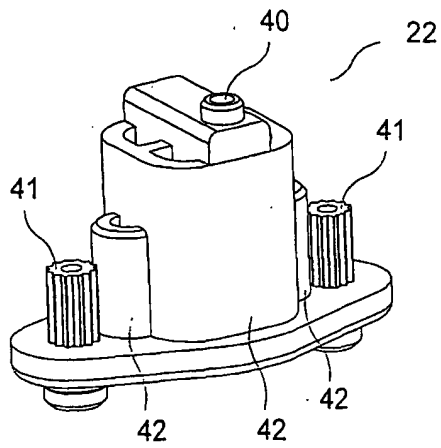


FIGURE 6B

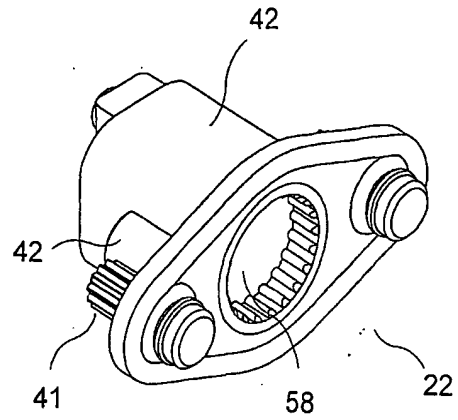


FIGURE 6C

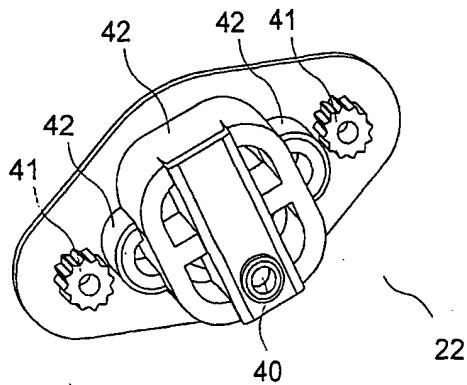


FIGURE 7

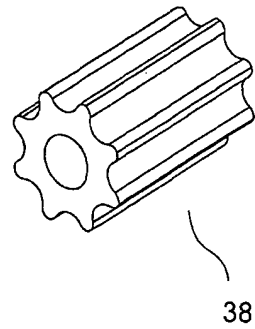


FIGURE 8

